

working hypothesis, it seems possible that iron meteorites will be associated with the metallic stars and stony meteorites with metalloid and compound stars. Of the iron group of metals in the sun, iron and nickel are those which exist in greatest quantity, as I have determined from the number of lines reversed. Other striking facts, such as the presence of hydrogen in meteorites, might also be referred to.

An interesting physical speculation connected with this working hypothesis is the effect on the period of duration of a star's heat which would be brought about by assuming that the original atoms of which a star is composed are possessed with the increased potential energy of combination which this hypothesis endows them with. From the earliest phase of a star's life the dissipation of energy would, as it were, bring into play a new supply of heat, and so prolong the star's light.

May it not also be that if chemists take up this question which has arisen from the spectroscopic evidence of what I have before termed the plasticity of the molecules of the metalloids taken as a whole, much of the power of variation which is at present accorded to metals may be traced home to the metalloids? I need only refer to the fact that, so far as I can learn, all so-called changes of atomicity take place when metalloids are involved, and not when metals alone are in question.

As instances of these, I may refer to the triatomic combinations formed with chlorine, oxygen, sulphur, &c. in the case of tetrad or hexad metals.

May we not from these ideas be justified in defining a metal, provisionally, as a substance, the absorption-spectrum of which is generally the same as the radiation-spectrum, while the metalloids are substances the absorption-spectrum of which, generally, is not the same? In other words, in passing from a cold to a comparatively hot state, the plasticity of these latter comes into play, and we get a new molecular arrangement. Hence are we not justified in asking whether the change from oxygen to ozone is but a type of what takes place in all metalloids?

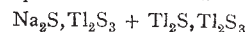
My best thanks are due to Mr. R. J. Friswell for the valuable aid he has afforded me in these investigations.

J. NORMAN LOCKYER

SCIENTIFIC SERIALS

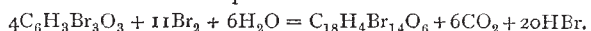
Poggendorff's Annalen der Physik und Chemie, 1874, No. 12.—This number completes vol. 153 of the series, and contains the following papers:—On the capacity of liquids for conducting heat, by A. Winkelmann; account of experiments based upon the same method which Stefan employed successfully for determining the heat-conducting capacity of air, and results tabulated for water, alcohol, bisulphide of carbon, glycerine, and solutions of chlorides of potassium and sodium.—On the elastic after-effects in torsion motions, by F. Neesen.—Experimental researches on the behaviour of non-conducting bodies under the influence of electric forces, by Ludwig Boltzmann. The author starts from the correct supposition that, according to the theories of Clausius, Maxwell, and Helmholtz on the behaviour of dielectric non-conductors in the electric field, the remarkable yet obvious consequence results (which seems to have been overlooked hitherto), that electric forces must necessarily exercise perceptible attraction upon non-conductors simply on account of their dielectric polarisation. The results he obtained were quite in correspondence with the theories his experiments were based upon.—On the action of electrophora, by P. Riess.—Critical remarks on electro-dynamics, by H. Helmholtz.—On the power of conducting electric currents in metallic sulphides, by Ferdinand Braun. This paper is a supplement to another one by Herr Herwig (vol. 153, No. 9, of these *Annals*), on the behaviour of iron and steel rods in galvanic currents.—On the reflection of light from the two surfaces of a lens, by Dr. Krebs. It is a well-known fact, that when light passes through a lens and we neglect the absorption in the interior of the lens itself, a certain quantity of light is reflected by the surfaces of the lens. Dr. Krebs for the first time gives a mathematical account of this phenomenon.—On the apparent place of a luminous point situated in a denser transparent medium, or that observed through a so-called plane-parallel plate, by K. L. Bauer. The author arrives at the conclusion that in most works on physics, and especially on optics, misrepresentations of the point in question are contained, and quotes as examples the works of Mousson, Wüllner, Crüger, Müller, Riedel, Schabus, Krebs, Frick, Bänitz, Weinhold, and Jochmann; the only praiseworthy exception he found was Harting's excellent work on the microscope.—On some new sulphur salts,

by R. Schneider (tenth paper). The new salts mentioned in this paper are a compound of the formula—

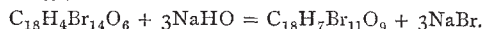


and another one of the formula Ti_6S_9 .—On a new eye-piece, by Dr. H. Krüss. The author points out that the latest improvements in optical instruments generally applied to object-glasses, and that the eye-pieces remained where Huyghens and Ramsden left them; he therefore directed his attention to the improvement of eye-pieces, which he describes. Whether these improvements will answer their purpose, practical experiments only can show.—A note, by G. Wiedemann, on the dissociation of salts containing water. Mr. Wiedemann claims priority with regard to the investigations of M. Debray (*Comptes Rendus*, t. 66, p. 194, 1868).—A note on the theory of electricity, by E. Edlund.—A note by F. Lippich, on an electro-dynamic experiment of F. Zoellner, described in these *Annals*, vol. 153, p. 138.—A note by O. E. Meyer, on a paper by Dr. G. Baumgartner, on the influence of temperature upon the velocity of effluence of water flowing from tubes (these *Annals*, vol. 153, p. 44).—A note by H. Baumhauer, on a paper of Dr. F. Exner, on the solution-figures upon the surfaces of crystals (these *Annals*, vol. 153, p. 53). Mr. Baumhauer points out that these figures are quite independent of the crystallographic construction of the substances undergoing solution.—On the rays of light which decompose the xanthophyll of plants, by J. Wiesner. Finally, A. Gawalowski describes a self-acting mercury valve for shutting off gases, and preventing their passage in any but the desired direction.

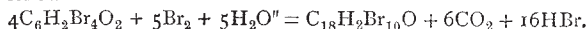
The *Journal of the Chemical Society* for January contains the following papers:—Action of bromine in presence of water on bromo-pyrogallol and on bromo-pyrocatechin, by Dr. J. Stenhouse. The action of bromine on pyrogallol gives rise to the formation of a yellow crystalline body of the formula $\text{C}_{18}\text{H}_4\text{Br}_{14}\text{O}_6$ in accordance with the equation—



The author has not been able to determine the constitution of this body, but proposes to name it provisionally *xanthogallol*. Alkalies act upon xanthogallol in presence of ether in the following manner:—



The excess of alkali at the same time reacts with the substance and forms an alkaline salt. The action of bromine and water on bromo-pyrocatechin gives rise to a crimson crystalline compound of the formula $\text{C}_{18}\text{H}_2\text{Br}_{10}\text{O}_6$, which the author has named provisionally *erythro-pyrocatechin*. This body is formed as follows:—



The next paper is by the same author, on the action of bromine on protocatechuic acid, gallic acid, and tannin. When protocatechuic acid is heated with excess of bromine in sealed tubes at 100° tetrabromopyrocatechin is produced, in accordance with the reaction—



The protocatechuic acid used was prepared from East Indian kino. Gallic acid heated with bromine to 100° gives rise to the formation of tribromopyrogallol, $\text{C}_6\text{H}_3\text{Br}_3\text{O}_3$. The reaction in the case of tannin is different according as the substance is perfectly dry or contains water. The action of chlorine on protocatechuic acid and on pyrogallol has likewise been studied.—On propionic coumarin and some of its derivatives, by W. H. Perkin. The author prepares this body by the action of propionic aldehyde on sodium-salicyl hydride. β -bromo-propionic coumarin has been prepared by substituting sodium-bromosalicyl hydride for sodium-salicyl hydride in the preparation of propionic coumarin. The same body is produced by the action of bromine in excess on propionic coumarin. By the further action of bromine (dissolved in CS_2) in a sealed tube heated to 150°, β -dibromopropionic coumarin is produced. Fuming sulphuric acid dissolves propionic coumarin with the formation of a sulpho-acid of the formula $\text{C}_{20}\text{H}_{16}\text{O}_4\text{S}_2\text{O}_6$.—Action of the organic acids and their anhydrides on the natural alkaloids, Part II.: Butyryl and benzoyl derivatives of morphine and codeine, by G. H. Beckett and Dr. C. R. A. Wright. The action of butyric acid on codeine gives rise to the formation of dibutyryl-codeine, $\text{C}_{36}\text{H}_{40}(\text{C}_4\text{H}_7\text{O}_2)_2\text{N}_2\text{O}_6$. Butyric aldehyde yields the same body when heated with codeine. When morphine is substituted for codeine, an analogous compound,

dibutyl morphine, $C_{24}H_{36}(C_4H_7O)_2N_2O_6$, is formed, and at the same time a non-crystalline base isomeric with this latter body is produced. Butyric anhydride heated with morphine forms a tetrabutyl derivative, which is decomposed on long-continued boiling with water into the dibutyl derivative. The authors next treat of acetyl-butyl-morphine, obtained by heating the alkaloid with a mixture of the acids. Benzoic anhydride gives with codeine a di-derivative, and with morphine a tetra-derivative, which is decomposed by water into dibenzoyl-morphine. Benzoic acid gives, with morphine, an α -di-derivative. The action of benzoic anhydride on α -diacetyl-morphine has been studied, and likewise the action of benzoic and acetic anhydrides on tetra-acetyl-morphine and on tetra-benzoyl-morphine.—The last paper communicated to the Society in the present number is by E. A. Parnell, on the use of potassium permanganate in volumetric analysis, and on the estimation of iron in iron ores.

Gazzetta Chimica Italiana, fascicolo ix. and x.—These parts contain the following papers:—On the dilatation of phosphorus, by G. Pisati and G. de Franchis; Action of sulphur on water and on calcium carbonate, by Brugnatelli and Pelloggio; Researches on the nature and constitution of tannic acid, by Hugo Schiff; Refractive indices of cymene, benzene, and of some derivatives of natural and synthetical thymol, by G. Pisati and E. Paterno. A. Casali contributes a paper on chrome green. Search for amylic alcohol in spirits of wine, by C. Bettelli. J. Macagno describes a volumetric process for determining phosphoric acid.—The concluding paper is by Grassi, on the fermentation of must.—The part contains also a number of abstracts of papers published in other journals.

Memorie della Società degli Spettroscopisti Italiani, November 1874.—This number contains a discussion of the coincidence of the lines in the spectrum of Jupiter with that of our atmosphere, by Father Secchi, in which he appears to disagree with the conclusions arrived at by Vogel as to the coincidence of the lines and the brightness of the same.—The same author contributes a note on the comparison of the spectra of the compounds of carbon with the spectrum of Coggia's Comet; and for reasons given by him he considers the spectrum of the oxides of carbon best correspond to that of the comet; and further, he considers one of the spectra of the electric arc most similar, for he has observed two spectra superposed when viewing that arc. On examining the spectrum of the comet with a polariscope the continuous spectrum disappeared, leaving only that of the bands, proving apparently that the continuous spectrum is reflected light only. Drawings of the chromosphere for July, August, September, October, and November, by Secchi, accompany this number.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, Feb. 11.—“On the Structure and Development of *Myriothele*,” by Prof. Allman.

The endoderm of the body is shown to be composed of numerous layers of large spherical cells of clear protoplasm. Externally it is continued in an altered form into the tentacles, while internally it forms long thick villus-like processes which project into the cavity of the body.

Interposed between the endoderm and the ectoderm is the *fibrillated layer*. It consists of longitudinal muscular fibrillæ, closely adherent to the outer surface of a structureless hyaline membrane—the “*Stützlamelle*” of Reichert.

The *ectoderm* is composed of small round cells containing yellowish granules. Among these the thread-cells may be seen, lying chiefly near the outer surface of the body.

The deeper part of the ectoderm consists of cells, each of which is prolonged into a tail-like process, so that they assume a claviform shape.

The male and female sporosacs are borne by the trophosome.

The generative elements, whether male or female, originate in a special cavity (gonogonetic chamber), which is formed in the substance of the endoderm of the sporosac.

Immediately after its expulsion it is seized by the sucker-like extremities of certain remarkable organs (claspers), which are developed among the blastostyles and resemble long filiform and very contractile tentacles.

The actinuloid, on its escape from its capsule, is provided not

only with long arms but with short scattered clavate tentacles. The short clavate tentacles become the permanent tentacles of the fully developed hydroid; the long arms, on the other hand, are purely embryonic and transitory.

The long embryonic arms originate in the spheroidal *Planula*. They are formed by a true invagination, and at first grow inwards into the body-cavity of the *Planula*. It is only just before the escape of the actinuloid from its capsule that they evaginate themselves and become external.

After enjoying for one or two days its free existence, during which it moves about by the aid of its long arms, the embryo fixes itself by its proximal end, the long arms gradually disappear, the short permanent tentacles increase in number, and the essential form of the adult is soon acquired.

Linnean Society, Feb. 18.—Dr. G. J. Allman, F.R.S., president, in the chair.—The following papers were read:—On the structure, affinities, and probable source of the large Human Flake, *Distoma crassum*, Busk, by Dr. T. S. Cobbold, F.R.S. The author commenced by recording all the facts he could gather respecting the original discovery of the parasite by Prof. Busk, dwelling especially on the circumstance that an interval of thirty years had elapsed since the first examples were made known to science. He next referred to other singular instances of the supposed rarity of certain human helminths, adducing the cases of *Tania nana* and *Distoma heterophyes*; and he also remarked upon the long lapse of time occurring between the periods of discovery and verification of particular species of Entozoa, instancing the cases of *Stephanurus dentatus* and *Distoma conjunctum*. He was indebted to Dr. George Johnson, F.R.S., for having brought the new hosts on bearers of *Distoma crassum* under his observation. The patients, a missionary and his wife, had been four years resident in China, most of their time being spent at Ningpo, where they had partaken freely of fish, cysters, and salads. The author of the paper had secured seven parasites, two from the lady and five from her husband. Only two of the seven specimens supplied him with such new facts as he had been able to make out in respect of the organisation of the animal. The only example which gave the best results Dr. Cobbold had since deposited in the University Museum at Oxford (Prof. Rolleston's department). He found the vitelline glands to be largely developed, and he believed that in place of there being two testes, as had hitherto been conjectured, there was only one large compound gland, with remarkably large and conspicuous seminal ducts. These ducts were well seen in the dried specimen exhibited to the Society. The hitherto supposed upper testis turned out to be the ovary, and there was a special and smaller organ in front of the ovary which he regarded as an unusually developed shell-gland. The intestinal tubes are simple and unbranched, but on the other hand the uterine organ appeared not to consist of a single continuous tube, but to be partly branched, as obtains in *D. lanceolatum*, and in some other less known flukes. The remainder of the communication was taken up with remarks on the affinities of the parasite, and with a brief résumé of the hitherto known facts of trematode development, in so far as they tended to throw light on the source of *Distoma crassum*. In particular he referred to the labours of Mr. Moseley in connection with the land planarians of Ceylon, to the contributions of Giard, Claparède, Pagenstecher, and others in respect of *Bucephalus*, and to the still more recent discoveries of Dr. Ernst Zeller as regards the destiny of *Leucochloridium*. From a general review of all the data thus obtained, Dr. Cobbold believed that the *Distoma crassum* had been obtained by the consumption, on the part of the missionary and his wife, either of Ningpo oysters or of fish insufficiently cooked. After the reading of the paper Mr. G. Busk and Dr. G. Johnson added a few more facts respecting the parasite.—On the external anatomy of *Tanais vittatus*, by Dr. M'Donald.

Mathematical Society, Feb. 11.—Prof. H. J. S. Smith, F.R.S., president, in the chair.—Prof. Cayley communicated two short notes: on a point in the theory of attractions, and on the question of the mechanical description of a quartic curve.—Prof. Sylvester exhibited a new sort of lady's fan, and briefly indicated its mode of construction and properties. With the fan it is possible to divide any angle into any assigned equal number of parts, and the trajectories of points taken in the several links connecting together the sticks of the fan have finite nodes whose numbers are successively, 1, 2⁴, 3⁴, 4⁴. . . . He then dwelt in detail on the expression of the curves generated by any given system whatever of linkwork under the form of an irreducible determinant. The author stated: That parallel motions exist at